# CAAM 334 · MATRIX ANALYSIS

Spring 2020 · Rice University

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| Lectures: | CAAM 334-2 (CRN: 22594) MWF 9:00–9:50AM, DCH 1064 |
| Web Site: | http://www.caam.rice.edu/~caam334 |
| Instructors: | CAAM 334-2: Cheryl Sershen (Cheryl.Sershen @ rice.edu), Duncan Hall 1064, 530–902–8251<br>Office Hours: M, W 12:00–1:00PM, Duncan Hall 3087 or by appointment. |
| Recitations: | 12-2 PM, DCH 3087. (Recitations start the second week of classes) |
| Course objectives: | Students should learn the four fundamental subspace associated with a matrix, learn how to characterize the solution of systems of linear equations and of linear least squares problems, how to compute the eigen-decomposition of matrices and the singular value decomposition of matrices, and how to apply these linear algebra tools to data science applications, such as clustering and classification. |
| Outcomes: | Apply the Fundamental Theorem of Linear Algebra to characterize solutions of linear systems.<br>Solve linear systems and linear least squares problems.<br>Compute eigenvalues and eigenvectors of matrices.<br>Compute the singular value decomposition (SVD) of matrices.<br>Apply linear algebra tools to select data science applications, such as clustering and classification. |
| Prerequisites: | (MATH 212 or MATH 222) AND CAAM 210.<br>Less formally: you should be familiar with multivariable calculus and elementary matrix manipulations (matrix addition and multiplication, Gaussian elimination), and be able to write MATLAB or Python programs. |
| Mutually Exclusive: | Credit cannot be earned for CAAM 334 and CAAM 335. |

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| Grading: | 40% homeworks, 60% exams. (Class participation and improving performance on the exams will be considered when assigning borderline grades.) |
| Homeworks: | Homework will be assigned roughly once a week. Typically a homework assignment is due one week after it has been posted. Unless otherwise stated, you may collaborate with other students, but you must write up your solutions separately. Transcribed solutions are unacceptable. *You may not consult solutions from previous sections of this class.*<br>Homework will be assigned via the CANVAS course site. *Visit the CANVAS site and the course web-page regularly.*<br>The lowest homework grade will be dropped. |
| Exams: | There are three exams. Each exam will each account for 20% of the final grade. The first two exams are take-home, timed, closed-book exams. The final exam is scheduled. Room and time for the 3rd exam will be determined by the Registrar's office later this semester.<br>Each exam must be your individual, unassisted effort; indicate compliance by writing out in full and signing the traditional pledge. |
| Late Policy: | Homeworks and exams must be turned in on time. |
| Required Reading: | *Linear Algebra in Situ* by Steven Cox. (Course pack available at campus store).<br>*Course Notes*. Available on the CANVAS course site; updated as the semester progresses. |
| Recommended Reading: | Carl Meyer, *Applied Matrix Analysis and Linear Algebra*<br>Gilbert Strang, *Linear Algebra and Its Applications*, 3rd ed.<br>Gilbert Strang, *Linear Algebra and Learning from Data* |
| Programming: | Homework assignments may require MATLAB or Python programming. Your solutions should adhere to good programming standards, and must not be copied from other students. |

*Any student with a disability requiring accommodation in this course is encouraged to contact the instructor during the first week of class, and also to contact Disability Support Services in the Ley Student Center.*